in size in place of the unpaired element of the spermatogonia. It has been assumed that in the maturation of the eggs all the chromosomes divide in both divisions, giving to each matured egg a group of chromosomes similar in all respects to that borne by the class of spermatozoa having the idiochromosome. In short, while the dimorphism of the spermatozoa has been shown to be a fact, the similarity of the eggs has rested upon inference only. It has been assumed further that if an egg is fertilized by a spermatozoon bearing the idiochromosome an embryo will be produced whose nuclei all have an even number of chromosomes similar in all respects to the oogonial groups, but if fertilized by a spermatozoon lacking that chromosome, the resulting embryonic nuclei will all have an odd number of chromosomes similar to the spermatogonial groups. The former class of embryos accordingly will be females, the latter males.

It seemed advisable to the writer to examine the oogenesis, fertilization and cleavage of the coreid family and determine if possible whether there is a basis of fact for these assumptions. With this end in view, sections of the eggs of *Archimerus, Anasa, Chelinidea* and *Protenor* were made, some before laying, but chiefly at intervals after laying. Although some difficulties of technique were encountered, fairly good series were obtained. The results are as follows:

The number of oogonial chromosomes in *Archimerus* is 16, in *Anasa* 22, and in *Protenor* 14. In the first polar (oocyte) division, these numbers are reduced to 8, 11 and 7, respectively. The chromosomes exhibit the same number and size relations as in the first spermatocytes except that the idiochromosome is here a bivalent, having resulted in all probability from the synapsis of two oogonial chromosomes. In *Protenor* the idiochromosome-bivalent can be readily identified by its size. In *Archimerus* all the chromosomes divide in both polar (oocyte) divisions and it is probable that the same is true for *Anasa* and *Protenor,* though all stages of maturation were not obtained in these two forms. As a result of maturation all the eggs are of one kind with regard to their chromatin-content, and further the female pronucleus contains a group of chromosomes similar in number and size relations to that of a spermatozoon bearing the idiochromosome. At fertilization the reduced groups in the male and female pronuclei are again distinguishable just before they enter the first cleavage spindle.

In the cleavage and early blastoderm nuclei of *Archimerus, Anasa, Chelinidea* and *Protenor,* the chromosomes can be readily counted, and show the same numbers and size relations as in the gonads, though, as a whole, somewhat more elongated. Two types of embryos are found, one having an odd, and the other an even number of chromosomes, these numbers being respectively the same as occur in the spermatogonia and oogonia. Accordingly, the former are males, the latter females. Thus in *Archimerus* the embryos have either 15 or 16 chromosomes, in *Anasa* and *Chelinidea* 21 or 22, in *Protenor* 13 or 14. In short the sex of an embryo may be determined by counting its chromosomes.

The results in general complete the history of the idiochromosome ("accessory" chromosome) and its mate, showing their behavior in the maturation of the egg and their presence, either singly or together, in the embryonic (somatic) nuclei. They also lend additional support to the theory of chromosome-individuality and to the recent theories of sex-production based upon cytological studies.

C. V. MORRILL

COLLEGE OF MEDICINE,
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SOCIETIES AND ACADEMIES

THE AMERICAN PHYSICAL SOCIETY

THE regular Thanksgiving meeting of the Physical Society was held in the new physical laboratory of the University of Illinois, Urbana, Ill., on Saturday, November 27, 1909. The meeting was well attended, practically all the universities of the middle west, as well as several in the east, being represented. President Henry Crew presided. The following papers were presented:

"Preparation and Properties of the Heusler Alloys," by A. A. Knowlton.

"Hysteresis Tests of Heusler Alloys," by A. A. Knowlton and O. G. Clifford.

"The Magnetic Properties of the Heusler Alloys," by E. B. Stephenson.

"The Effect of Temperature on the Magnetic Properties of Electrolytic Iron," by Earle M. Terry.

"The Point Discharge in Air for Pressures Greater than Atmospheric," by O. A. Gage.

"On the Mechanical Equivalent of Heat by a Porous Plug Method," by J. R. Roebuck. (Read by title.)

"The Elastic Properties of Platinum-iridium Wire," by Karl E. Guthe.

"An Apparatus for Measuring Sound," by F. R. Watson.

"Polarization of Cadmium Cells," by R. R. Ramsey.

"A Method for Determining the Optical Constants of Metals Applicable to Measurements in the Infra-red," by L. R. Ingersoll.

"The Absolute Values of the Moments of Elementary Magnets," by Jakob Kunz.

"An Apparatus for Studying Moment of Inertia," by C. M. Smith. (Read by title.)

"Some Curious Phenomena Observed in Connection with Melde's Experiment," by J. S. Stokes.

"'Porous Plug' and 'Free Expansion' Effects under Varying Pressure," by A. G. Worthing.

"The Absorption of X-rays an Additative Property," by R. A. Millikan and E. J. Moore.

"A Comparison of the Echelon and Diffraction Gratings," by H. B. Lemon.

"The Value of e by Wilson's Method," by A. Begeman.

"The Flow of Energy in an Interference Field," by Max Mason.

"The Stark Effect with Canal Rays," by G. S. Fulcher.

Ernest Merritt,
Secretary

THE GEOLOGICAL SOCIETY OF WASHINGTON

At the 222d meeting of the society, held at the George Washington University, on Wednesday evening, November 10, 1909, Mr. Waldemar Lindgren offered an informal communication regarding the discovery of a selenium mineral in the gold-quartz ores of the Republic district, Washington State. The veins, which have yielded several million dollars in gold, are contained in Tertiary andesitic rocks and tuffs. The vein matter is quartz, chalcedony and opal deposited in concentric crusts. "Adularia, in considerable amount, also occurs in the gangue." Ore minerals and particularly native gold are rarely visible in the gangue and the ores have proved very difficult to treat. In rich ores slight, black streaks indicate the presence of metallic minerals and in a few places, in the Republic mine, a well-defined black or dark gray mineral forms crusts a few millimeters in thickness. This material is exceedingly rich in gold, but contains no free metal. It consists mainly of an antimonial tetrahedrite associated with specks of chalcopyrite. A partial analysis by Dr. Palmer, of the U. S. Geological Survey, showed no tellurium, but the presence of about one per cent. of selenium, which in all probability is combined with the gold. This interesting result places the Republic veins in the rare class of Tertiary selenide veins, of which Tonopah is the only known representative in the United States. "From descriptions, one of the few deposits of this kind, outside of the United States, is that of Radjang Lebong in Sumatra." No doubt the difficulties which have been experienced in the treatment of these ores are attributable to the presence of selenium compounds. Further metallographic investigations are now in progress to determine the exact character of the selenide.

Regular Program

Characteristics of some Ore Deposits of Southern Humboldt County, Nevada: F. L. Ransome.

A large proportion of the deposits of southern Humboldt County consist of silver ores carrying varying minor quantities of gold. These ores are prevailingly antimonial, the silver being combined chiefly in tetrahedrite or jamesonite. They generally contain in addition a little galena (probably argentiferous) and sphalerite, with of course some pyrite. The gangue is quartz, and as a rule the sulphides are subordinate to the gangue and are rather finely disseminated through it. Argentite and other rich silver-bearing minerals may occur in the upper parts of some of these deposits.

The deposits that owe their value chiefly to gold are those at Seven Troughs and at Chafey. Those at Seven Troughs are in Tertiary volcanic rocks; those at Chafey are in Mesozoic volcanic and sedimentary rocks, probably Triassic.

Like the gold deposits, the copper deposits of the region fall into two classes. One of these is exemplified by the deposits southwest of Boyer's ranch in Tertiary andesite, and by those at Red Butte, which are in igneous rocks doubtfully regarded as of Tertiary age. The deposits at Coppereid and Adelaide, on the other hand, are in calcareous sedimentary rocks, probably belonging to the Triassic. They have the mineralogic characteristics of contact metamorphic deposits. Gar-

net, chalcopyrite, pyrrhotite, sphalerite and pyrite are common to both localities. Axinite, fluorite, epidote and specularite occur in the contact zone at Coppereid, but were not noted at Adelaide. At the latter place the altered limestone contains vesuvianite, diopside and orthoclase.

The antimony and quicksilver deposits, with the exception of some stibnite at Seven Troughs, are all, so far as is known, in Triassic or Jurassic rocks, and are supposedly of the same age as the antimonial silver-gold ores. No facts are known, however, that rule out a Tertiary age for some of these deposits.

The nickel and cobalt deposits in Cottonwood Canyon consist of sulpharsenites of nickel (gersdorffite in part), tetrahedrite and some compound of cobalt with sulphur, arsenic or antimony, with the various oxidation products of these minerals. The ores fill small fissures in much altered andesite or andesite breccia cut by diorite, and may be genetically related to the intrusion of the latter rock.

The southern portion of Humboldt County is part of a metallogenetic province characterized chiefly by the prevalence of antimonial ores of silver with numerous and widely scattered deposits of stibnite and cinnabar. There are in addition some deposits of gold-silver, copper and nickel-cobalt ores. Ore deposition probably began immediately after the intrusion of the Triassic and Jurassic sediments in late Mesozoic time by a granodioritic magma, comparable with that which invaded the rocks of the Sierra Nevada at the same period and continued into the Tertiary. The known Tertiary deposits are essentially gold-silver ores and copper ores, but it is possible that some of the other types are also Tertiary.

Refractive Index of Canada Balsam: F. C. CALKINS.

A very convenient and constantly utilized aid to the determination of minerals in thin section being a comparison of their refractive indices with that of Canada balsam, it is obviously important to know as definitely as possible how widely the refringence of balsam in good slides is likely to vary. The published statements regarding this matter, however, are meager and contradictory, and their experimental basis appears in no case to have been recorded. The following experiments were carried out for the purpose of determining the approximate mean and extremes of the refractive index of the balsam in the slides made for the U. S. Geological Survey.

First, the refractive index of balsam (η) was compared with ω of quartz (1.544) in 300 slides from one to eight years old. It was found that η exceeded ω in only one case out of one hundred, except where the cover-glass was sprung away; where η was greater than 1.544 the excess was extremely small and the balsam was noticeably yellow.

The lowest value observed was between γ and β of nearly pure albite, about $1.535 \pm .002$.

Mr. W. T. Schaller supplemented these observations by measurements with an Abbe refractometer on blank preparations representing the condition of the balsam in normal, in undercooked and in overcooked preparations. The extremes found by Mr. Schaller were 1.535 and 1.543, the mean of eleven measurements 1.5393. The refractive index of one sample of highly fluid uncooked balsam was found to be 1.524.

It therefore appears that the mean refractive index of Canada balsam in good petrographic slides is about 1.54, and that it rarely is less than 1.535 or more than 1.545.

Paleozoic Erosion Channels: E. O. ULRICH.

Fossil erosion channels and caverns afford a valuable proof of the repeated emergence of the sea bottom, they being mostly of sub-aerial origin.

Channels and caverns of Pennsylvanian, Mississippian and late Devonian age have been described and figured, but earlier examples, though abundant and of unmistakable origin, have remained but imperfectly known.

Erosion channels may be divided into three classes: superficial, submarine and subterranean. The first class embraces all sub-aerial channels formed by running water, including tidal overflows. The second class embraces all channels produced by currents scouring the sea bottom; these are very rare as strong currents manifestly seldom occur in the shallower epicontinental seas. The third class includes solution cavities and caverns formed in limestones and dolomites by the action of acidulated surface waters.

As illustrating superficial erosion, may be mentioned channels in the Trenton at Trenton Falls, New York, which were probably in the nature of "guts" on ancient tidal flats. Concomitant with the formation of these channels gravitational slumping occurred, resulting in their partial filling with much distorted strata. A doubtful instance of submarine erosion is found in the Fern Glen (Kinderhook) in northern Arkansas, with an overlap of Boone chert. To this same class probably belongs an intraformational erosion surface exhibited by the Lowville near Watertown, N. Y. Most

striking examples of solution cavities and caverns occur in the flanks of the Ozark uplift in Missouri. Some of the caverns are excavated in the pre-Ordovician Jefferson City dolomite, others in Niagara limestone; the filling in either case consisting chiefly of late Devonian and early Mississippian sandstones. Others again occur in late Devonian limestone, while several instances in Ordovician limestone of Lowville and Stones River age were found filled with later Ordovician sediments.

PHILIP S. SMITH,
Secretary

THE 223d meeting of the society was held at the George Washington University on Wednesday evening, November 24, 1909.

Regular Program

Rock Glaciers in Alaska: STEPHEN R. CAPPS.

The rock glaciers, a hitherto undescribed feature, occur in large numbers and in exceptionally perfect development in the area covered by the Nizina Special Map, Copper River region, Alaska. They all head in glacial cirques and extend from these down into the valleys, varying in width from one tenth to three fifths miles, and in length from one half to two and one half miles. The surface slopes range from 9° to 18°. In slopes, shape and surface markings they bear a striking resemblance to glaciers. In the upper portions longitudinal ridges and furrows are conspicuous, while toward the lower ends the ridges become concentric, parallel with the borders of the lower ends of the flows. A few of the rock glaciers actually grade into true glaciers at their upper ends. Most of them, however, show no ice or snow on the surface, the fragmentary rock of which they are composed extending up to the cirque walls above.

All the rock glaciers examined were found to be cemented with interstitial ice, which filled the openings to within a few feet of the surface at their upper ends, but was farther from the surface in the lower ends. This ice has imparted to the mass of rock waste a kind of glacial movement which is thought to be still in operation in many of the flows. The typical rock glaciers differ from true glaciers in that they head in cirques in which there are no perennial snows; in the purely interstitial character of the ice; and in their ability to endure in climatic conditions in which ordinary glaciers can not exist.

Canyon de Chelly, Arizona: M. R. CAMPBELL.

(No abstract.)

Geological Observations in Iceland: FRED. EUGENE WRIGHT.

Geologic mapping in Iceland is still in the reconnaisance stage. Most of its geologic features are as yet known only in a general way. Like the Faroe Islands, Iceland consists almost wholly of volcanic rocks (basalt) and associated tuffs and breccias. Thorrodsen has shown that the earliest rocks now exposed are probably of early Miocene age and that volcanic activity has characterized the island since its uplift in early Miocene or late Eocene. Among its most striking structural features is block faulting, but interest in the island centers chiefly in its volcanic and glacial phenomena. Among the former are explosion craters, lava cone craters, crater series along faults, fissure eruptions, secondary craters, etc., in model-like development and on a scale far surpassing that of any other country. Among the latter are the erosional effects of both continental and valley glaciers, especially prominent in north Iceland where the basalt formation is nearly flat-lying and homogeneous in character. The valleys exhibit: U-cross-sections, hanging side valleys, steepening of grade toward valley head with tendency toward cirque development, glacial grooves and markings along valley sides, truncation and alignment of spurs, etc., between tributary valleys, low cigar-shaped spurs at junction of larger tributary valleys attenuated by overriding of glaciers confluent at acute angles. In a country covered with an ice-cap, the surface of the ice sheet is an important plane of reference which in its physiographic effect is often similar to that of a water surface, as sea-level, toward which all exposed land surface tends to be reduced. The mountains and rock cliffs emergent above the ice-sheet undergo rapid changes in temperature with accompanying shattering due to expansion of included moisture in freezing, and tend to break down rapidly and to be reduced to the level of the ice surface. Whatever the nature of the erosional activities going on below the surface of the ice cap, the ultimate result will be a truncation of the mountains at a common level, strongly resembling in appearance an uplifted and dissected peneplain.

FRANCOIS E. MATTHES,
Secretary

AT the 224th meeting of the society, held on December 8, 1909, Mr. Arthur Keith presented the following paper: "The Status of Geologic Names."

The student of stratigraphy in anything except

the most limited way at once encounters the question of names. In the pioneer stage of geology a name is required for each new unit described, since exact correlation with existing names is usually impossible. This is less true of the second stage of geologic work, where information is accumulated and names multiplied. American geology has now advanced to the third or selective stage, where many correlations are certain, and preliminary names are gradually passing.

The most oppressive fact to the student is the flood of names. About 3,500 have now been used in the United States and Alaska, and to them nearly 100 new ones are added yearly. The labor of digesting these seems almost prohibitive to stratigraphic progress. A single name is applied to two or three different units, and for the same unit there may be five or six different names.

The complexity is increased by poor definitions and shifting limits of the units. Limited attempts have been made to reduce and correlate. Individuals and state surveys have done their part locally, the U. S. Geological Survey has issued correlation bulletins covering the United States, and a general committee representing the chief American organizations has recently been formed to make recommendations on names.

The chief attack on the chaos is now being made by the committee on geologic names in the United States Survey. All names used in papers issued by the survey or its members are considered by this committee. Exact definitions and type localities are required for new names, and the use and correlation of old names considered. Comparative harmony is thus secured, the number of new names is kept down, poor uses are rejected and useless names abandoned. The committee takes acount of priority, clearness of definition and locality, and the usage of each term, no one feature being supreme. Various catalogues of the committee cover its own action, the full list of names in use, the names in each system, in each state, and the various columnar sections published in each state. All of these are complete to date except the last, on which work is steadily proceeding, and are available for general consultation. These are leading to a comprehensive correlation of the formations of the United States.

The underlying motive of all this work is utility. A name is given to a stratigraphic unit for convenience in referring to it. If the definition is exact and the use consistent, the idea conveyed will be precise. If it is not precise it is not scientific, and should be avoided as obscuring the mental image. If a geologic name for a unit could be extended over the whole country, the case would be ideal and the image would be called up with the least effort. Many formations and names can be carried far and wide, and in that degree will the alphabet of geology be simplified. To sift and tie together the loose mass of names will cause hardships, but they will be lost sight of in the enormous gain in ease and clearness. The present incubus of names is something to be shaken off at the earliest moment.

At the close of Mr. Keith's address the seventeenth annual meeting of the society was held for the purpose of electing officers, and the following officers were elected for the ensuing year:

President—M. R. Campbell.

Vice-presidents—T. W. Stanton and David White.

Secretaries—Francois E. Matthes and Edson S. Bastin.

Treasurer—C. A. Fisher.

Members at Large of the Council—Geo. H. Ashley, F. B. Van Horn, Geo. W. Stose, A. R. Schultz, W. C. Mendenhall.

PHILIP S. SMITH,
Secretary

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 671st meeting was held in the West Hall of George Washington University on November 20, 1909, President Wead in the chair. Two papers were read:

The First Cruise of the "Carnegie" and her Equipment: Dr. L. A. BAUER, of the Carnegie Institution of Washington.

The Producer Gas Engine on the "Carnegie": Mr. CARL D. SMITH, of the U. S. Geological Survey.

A detailed description was given of the non-magnetic producer gas engine plant installed on the *Carnegie*, and the principles involved in its construction and operation were illustrated by lantern slides. The plant consists essentially of a gas producer and a producer gas engine with the necessary accessories.

This unique engine, which is constructed almost exclusively of non-magnetic materials, is a new departure in marine motive power, both as regards the materials used in its construction and in its application to a sea-going vessel.

For an account of the success already achieved by this plant and its remarkable economy of fuel consumption, see the abstract of the paper by

Dr. L. A. Bauer on "The First Cruise of the *Carnegie* and her Equipment," which will be printed in SCIENCE.

THE 672d meeting was held in Hubbard Memorial Hall on December 4, 1909, President Wead in the chair. The evening was devoted to addresses commemorative of the life and work of Professor Simon Newcomb. Addresses were made by the following persons:

The Right Hon. James Bryce, ambassador from Great Britain; Professor Milton Updegraff, director, Nautical Almanac; Dr. R. S. Woodward, president of the Carnegie Institution of Washington; Dr. L. O. Howard, chief, Bureau of Entomology, Agricultural Department; Professor E. M. Gallaudet, president, Gallaudet College.

At the close of the addresses the following resolutions were read and adopted:

WHEREAS the Philosophical Society of Washington has been deprived by death of the fellowship of Simon Newcomb, and

WHEREAS he was for thirty-eight years one of its active members and twice served as its president, be it

Resolved that the society record its high appreciation of his phenomenal talents, his preeminent attainments and his scholarly discussion of the many topics which his broad sympathies and varied interests proposed for consideration. And be it further

Resolved that this society unite with the learned societies and institutions of the entire world in testifying to the loss to science and high learning which his death occasioned; and that we hereby convey to the bereaved family assurance of our profound sympathy.

R. L. FARIS,
Secretary

THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

THE thirty-fifth meeting of the society was held at the College of Physicians and Surgeons, October 20, 1909, with President Lee in the chair.

Members present: Auer, Ewing, Famulener, Foster, Gies, Harris, Hatcher, Hunter, Joseph, Lamar, Lee, Levene, Levin, Meltzer, Mayer, Meyer, Morgan, Morse, Murlin, Norris, Noguchi, Opie, Park, Pearce, Rous, Symmers, Schaffer, Stockard, Van Slyke, Wadsworth, Weil, Wolf, Zinsser.

Scientific Program

Charles R. Stockard: "The Influence of Alcohol and other Anesthetics on Developing Embryos."

Richard Weil: "On the Variation in the Resistance of Human Erythrocytes in Disease to Hemolysins, with Especial Reference to Syphilis."

W. Koch and F. W. Upson: "The Distribution of Sulphur Compounds in Brain Tissue."

Robert L. Benson and H. Gideon Wells: "The Study of Autolysis by Physico-chemical Methods."

A. I. Ringer (by invitation): "Influence of Adrenalin in Phlorhizin Diabetes."

Andrew Hunter: "A Method for the Determination of Small Quantities of Iodine in Organic Material."

Sutherland Simpson and Andrew Hunter: "Relations between the Thyroid and Pituitary Glands."

Peyton Rous: "Parabiosis as a Test for Circulating Antibodies in Cancer."

Jean V. Cooke (by invitation): "The Excretion of Calcium and Magnesium after Parathyroidectomy."

Hideyo Noguchi: "Non-fixation of Complement."

Hideyo Noguchi: "The Fate of So-called Syphilitic Antibody in the Precipitin Reaction."

Thorne M. Carpenter and John R. Murlin: "The Energy Metabolism of Parturient Women."

Alfred G. Mayer: "The Relation between Ciliary and Muscular Movements."

EUGENE L. OPIE,
Secretary

THE AMERICAN CHEMICAL SOCIETY
NORTHEASTERN SECTION

THE ninety-fifth regular meeting of the section was held at the Twentieth Century Club, Boston, on November 26. The annual election of officers took place. Dr. P. A. Levene, of the Rockefeller Institute for Medical Research, in an address on "The Biochemistry of Nucleic Acids," described how the structure of these compounds had been determined by a study of the cleavage products produced by hydrolysis under various conditions.

Dr. H. A. Torrey, of Harvard University, addressed the section on "Alkali-insoluble Phenols. Does structural chemistry explain them?" After having shown that several rather obvious hypotheses as to the relation of structure of certain phenols to their action with alkalies were untenable, the speaker offered the explanation that the unexpected action of these substances might be due to the existence of an equilibrium between a phenol and quinoid form.

K. L. MARK,
Secretary